IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 18, Issue 4 Ser. 19 (April. 2019), PP 66-69
www.iosrjournals.org

Hemi Spinal Anaesthesia with Low Dose Bupivacaine with Fentanyl for Lower Limb Surgeries in Critically Ill Patients.

Dr Pranathi E[1], Dr. Praneeth J[1], Dr T Suryasree[2]., Dr. Zareena[3].
[1]*Post Graduate in Dept. Of Anaesthesiology, Siddhartha Medical College/Govt. General Hospital, Vijayawada, A.P., India*
[2]*Professor and Head of Dept.of Anaesthesiology, Siddhartha Medical College/Govt. General Hospital, Vijayawada, A.P., India*
[3]*Assistant Professor, Dept.of Anaesthesiology, Siddhartha Medical College/Govt. General Hospital, Vijayawada, A.P., India*
Corresponding Author: Dr Pranathi E

Abstract: *Hemi spinal anaesthesia is a promising alternative to traditional, widely used technique of central neuraxial blocks, as it markedly restricts the anesthetized area, thereby, decreasing the risk of adverse events and complications[1].Use of conventional doses of Bupivacaine is associated with haemodynamic instability, prolonged blockade. Low dose bupivacaine with lipophilic opioid like fentanyl has been reported to obtain satisfactory hemi spinal anaesthesia and less cardiovascular side effects. This study was done to know effectiveness of low dose Bupivacaine , 2.5mg with 25mcg Fentanyl for hemi spinal anaesthesia in lower limb surgeries in critically ill patients. 30 patients aged 50-80 years of ASA class 3 and 4 were included in this study. They were given hemi spinal anaesthesia with 2.5 mg of Bupivacaine plus 25 mcg of Fentanyl. The mean duration of surgery was 50.63±15.4 minutes. The time taken for onset of sensory block was 6.17±1.44 minutes, the maximum level of sensory block was T 10 in blocked limb time taken to reach peak sensory blockade was 15.43 ± 2.66 minutes. Time for two segment regression was 70.6±11.89 minutes and time taken for the sensory block to recede till L3 was 132.97±11.89 minutes. This study demonstrates that small dose of bupivacaine in hemi spinal block is enough to provide optimal anaesthesia for short duration lower limb surgeries in critically ill patients.*

Keywords: *Hemi spinal anaesthesia, critically ill patients, intrathecal Fentanyl, hyperbaric, bupivacaine.*

Date of Submission: 16-04-2019 Date of acceptance: 01-05-2019

I. Introduction

It is universally agreed that anaesthesia of choice for lower limb surgery is subarachnoid block. However spinal anaesthesia has got its own inherent complications, especially related to cardiovascular instability. Perioperative hypotension may affect postoperative recovery. The high incidence of perioperative coronary disease, increases risk of ischemia secondary to hypotension especially in critically ill patients like patients of uncontrolled diabetes mellitus, patients in congestive cardiac failure, patients with low cardiac output and ejection fraction and patients with multi organ compromise. Studies have established that opioids and local anaesthetics administered together intrathecally have potent synergistic analgesic effect, enhancing the sensory blockade without altering the degree of sympathetic blockade ensuring better hemodynamic stability[2, 3, 4]

II. Aim

To study effectiveness of low dose Bupivacaine, 2.5mg with 25mcg fentanyl in lower limb surgeries in critically ill patients.

III. Materials and methods

Study design: This is a Prospective observational study.
Study duration: January 2017 to January 2018
Study Location: Government general hospital attached to Siddhartha Medical College, Vijayawada.
Study sample size: 30 patients of either sex
Inclusion criteria: Patients Aged 50-80 years of ASA class 3, 4 posted for elective and emergency lower limb surgeries with less than 2 hours of duration were included in this study.

Exclusion criteria: Pregnant women, surgeries lasting for more than 2 hours Difficult airway, and contraindications to spinal anaesthesia like hypersensitive reactions to local anaesthetic, deranged coagulation profile, spine deformity etc., were excluded from this study.

Procedure: After obtaining informed consent patients were taken to OT, non invasive monitors were attached and base line vitals noted. IV line secured with 18 G intravenous catheter. Under strict aseptic precautions in lateral decubitus position subarachnoid block was given with 2.5 mg bupivacaine plus 25 mcg fentanyl with 25 guage Quinckie Babcock needle in L3-L4 interspace.Patient was placed in that position for 7minutes and then turned supine.

HAEMODYNAMICS:

Recorded every 5 minutes for first 30 minutes then every 15 minutes till end of surgery.
Decrease in SBP >20% was noted as hypotension treated with 6mg mephentermine.
Decrease in HR of < 40/min was noted as bradycardia treated with 0.6 mg of atropine.
RR of <10/min and spo2<94% was noted as respiratory depression treated with oxygen 4-6l through facemask.
SENSORY BLOCK: Elicited with pinprick with 20G hypodermic needle bilaterally till maximum sensory level is stabilised.
MOTOR BLOCK: Assessed with modified Bromage scale.

SCORE	RESPONSE
0	Full flexion of knee , free movement of feet.
1	Just able to flex knees and free movement of feet.
2	Able to move feet only.
3	Unable to move feet or knees.

IV. Results

Descriptive analytical studies were carried out in present study. Results on continuous measurements are presented on mean±SD and results on categorical measurement are presented in Number %
Demographic variables are insignificant.

No failed block or inadequate analgesia was seen. No respiratory depressionwas observed. Pruritis was noted in 4 patients treated with chlorpheneramine maleate. No supplement sedation or analgesia was required.

The mean duration of surgery was 50.63±15.4 minutes. The time taken for onset of sensory block was 6.17±1.44 minutes, the maximum level of sensory block was T 10 in blocked limb time taken to reach peak sensory blockade was 15.43 ± 2.66 minutes. Time for two segment regression was 70.6±11.89 minutes and time taken for the sensory block to recede till L3 was 132.97±11.89 minutes.

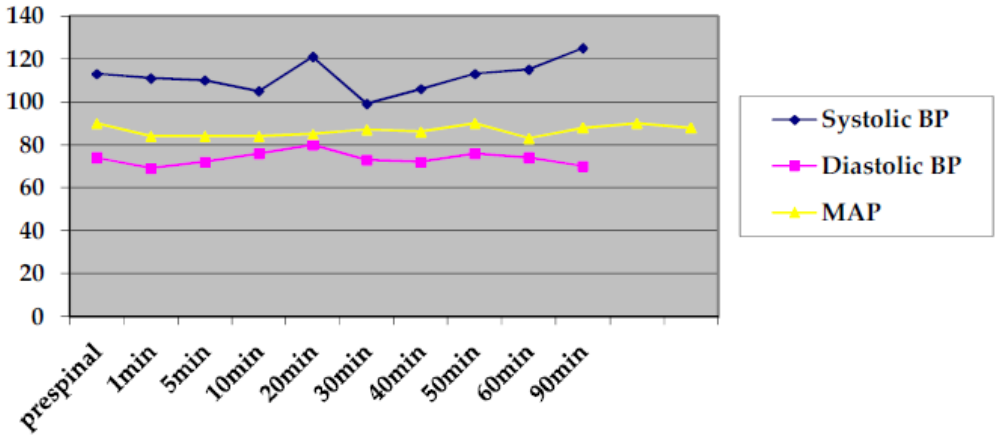
Table01: Table showing Sensory block characteristics:

onset	**Peak sensory level in operated limb**	**Time to reach peak sensory level**	**2 segment regression**	**Regression to L3**	**Peak sensory level in non operated limb**
6.17±1.44 min	T10 (T8-T10)	15.43±2.66 min	70.6±11.89min	132.97±11.29 min	L3

Table 02: Table showing motor block characteristics:

Bromage score	**Count (in operated limb)**	**Count (in non operated limb)**
3	5	2
2	12	4
1	3	3
0	0	9

Figure 01 : Line diagram showing Haemodynamic parameters:



V. Discussion

Hemi spinal anaesthesia is used when block is needed only on operative side There is no entity called hemi spinal anaesthesia. When surgery involves only one lower limb administration of spinal anaesthesia and lateral positioning of the patient with operative limb dependent, results in less blockade in non operating limb. This is advantageous and minimizes hemodynamic changes associated with conventional spinal anaesthesia. It also enables faster recovery and early discharge[5, 6, 7]. It is much useful in critically ill patients, patients with cardiac failure , low ejection fraction etc, in whom the systemic vascular resistance(SVR) and blood pressure may decrease more[8, 9] than in patients with good left ventricular function[10]. Previous studies showed that hypotension after spinal block could be minimized by using of small dose of local anesthetics[11].

Patients with low ejection fraction are preload-dependent and spinal block can further lower stroke volume and decrease cardiacoutput. Previous studies identified that spinal block may decrease LVEDV up to 19% and this

Modification was the primary cause of decrease n cardiac output especially in patients with low ejection fraction[12]. Patients with low cardiac index who underwent spinal block with low dose of local anaesthetic showed less decrease in mean arterial pressure because small dose of local anaesthetic blocked sympathetic system less than traditional dose.

Lidocaine was used as drug for spinal anaesthesia in past. It is associated with permanent and transient neurotoxicity. This led to exploration of adapting the longer acting spinal bupivacaine to ambulatory anaesthesia [13, 14, 15].Conventional large dose bupivacaine may delay the recovery of motor function, may cause urinary retention, hemodynamic instability, leading to delayed discharge. So the interest was increased to use small doses of bupivacaine .Fentanyl is a lipophilic opioid usually used as an adjunct to local anaesthetics for enhancement of analgesia without intensifying motor and sympathetic block during spinal anaesthesia..

There are no associated side effects except mild Pruritis.

VI. Conclusion

Hemi spinal anaesthesia with a low dose, limited volume technique induces sufficient motor block with an appropriate level of analgesia. Addition of fentanyl enhances the quality of anaesthesia without any major side effects. Therefore, we conclude that unilateral spinal block with low dose local anaesthetic and fentanyl is a safe and effective method for lower limb surgery in critically ill patients.However further studies are required in this regard with larger sample size and a comparative study with control group, so that results of study can be generalized.

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